



## LIMK1 gene

LIM domain kinase 1

### Normal Function

The *LIMK1* gene provides instructions for making a protein that is highly active in the brain, where it is thought to be involved in the development of nerve cells. Studies suggest that this protein may play an important role in areas of the brain that are responsible for processing visual-spatial information (visuospatial constructive cognition). These parts of the brain are important for visualizing an object as a set of parts and performing tasks such as writing, drawing, constructing models, and assembling puzzles.

Within cells, the LIMK1 protein likely regulates aspects of the cytoskeleton, the structural framework that helps to determine cell shape, size, and movement. The LIMK1 protein helps control the organization of actin filaments, which are long, thin fibers that make up a significant part of the cytoskeleton. Actin filaments are necessary for several normal cellular functions, such as cell division, cell movement (motility), maintenance of cell shape, transport of proteins and other molecules within cells, and chemical signaling between cells.

### Health Conditions Related to Genetic Changes

#### Williams syndrome

The *LIMK1* gene is located in a region of chromosome 7 that is deleted in people with Williams syndrome. As a result of this deletion, people with this condition are missing one copy of the *LIMK1* gene in each cell. Some studies suggest that a loss of this gene contributes to the characteristic problems with visual-spatial tasks (such as writing and drawing) seen in Williams syndrome; however, other studies have not found this connection. Although a deletion of this gene probably affects the development and function of nerve cells in the brain, researchers have not determined how a reduction in the amount of LIMK1 protein could be related to the specific impairments seen in Williams syndrome.

#### cancers

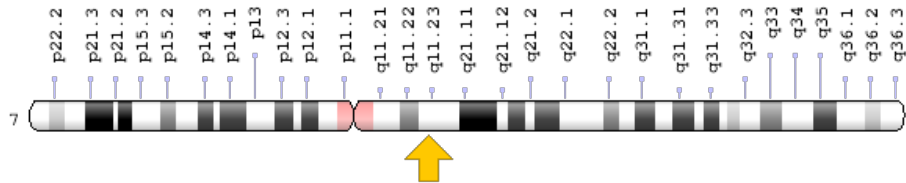
The LIMK1 protein is produced at unusually high levels (overexpressed) in some cancerous tumors. For example, increased amounts of this protein have been found in a form of skin cancer called melanoma and in cancers of the ovary, lung, breast, and prostate. Researchers believe that high levels of the LIMK1 protein may be

associated with changes in the organization of actin filaments and an increased chance that a tumor will invade other tissues.

### Chromosomal Location

Cytogenetic Location: 7q11.23, which is the long (q) arm of chromosome 7 at position 11.23

Molecular Location: base pairs 74,083,777 to 74,122,525 on chromosome 7 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

### Other Names for This Gene

- LIM kinase
- LIM kinase 1
- LIM motif-containing protein kinase
- LIMK
- LIMK-1
- LIMK1\_HUMAN

### Additional Information & Resources

#### Educational Resources

- Eureka Bioscience Collection: Diverse Functions of LIM-Containing Proteins  
<https://www.ncbi.nlm.nih.gov/books/NBK6372/>

#### GeneReviews

- Williams Syndrome  
<https://www.ncbi.nlm.nih.gov/books/NBK1249>

### Scientific Articles on PubMed

- PubMed  
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28LIMK1%5BTIAB%5D%29+OR+%28%28LIMK%5BTIAB%5D%29+OR+%28LIMK-1%5BTIAB%5D%29+OR+%28LIM+kinase+1%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+2160+days%22%5Bdp%5D>

### OMIM

- LIM DOMAIN KINASE 1  
<http://omim.org/entry/601329>

### Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology  
<http://atlasgeneticsoncology.org/Genes/LIMK1ID41159ch7q11.html>
- HGNC Gene Family: LIM domain containing  
<http://www.genenames.org/cgi-bin/genefamilies/set/1218>
- HGNC Gene Family: PDZ domain containing  
<http://www.genenames.org/cgi-bin/genefamilies/set/1220>
- HGNC Gene Symbol Report  
[http://www.genenames.org/cgi-bin/gene\\_symbol\\_report?q=data/hgnc\\_data.php&hgnc\\_id=6613](http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=6613)
- NCBI Gene  
<https://www.ncbi.nlm.nih.gov/gene/3984>
- UniProt  
<http://www.uniprot.org/uniprot/P53667>

### **Sources for This Summary**

- Davila M, Frost AR, Grizzle WE, Chakrabarti R. LIM kinase 1 is essential for the invasive growth of prostate epithelial cells: implications in prostate cancer. J Biol Chem. 2003 Sep 19;278(38):36868-75. Epub 2003 Jun 23.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/12821664>
- Davila M, Jhala D, Ghosh D, Grizzle WE, Chakrabarti R. Expression of LIM kinase 1 is associated with reversible G1/S phase arrest, chromosomal instability and prostate cancer. Mol Cancer. 2007 Jun 8;6:40.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/17559677>  
*Free article on PubMed Central:* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913540/>
- GeneReview: Williams Syndrome  
<https://www.ncbi.nlm.nih.gov/books/NBK1249>

- Gray V, Karmiloff-Smith A, Funnell E, Tassabehji M. In-depth analysis of spatial cognition in Williams syndrome: A critical assessment of the role of the LIMK1 gene. *Neuropsychologia*. 2006; 44(5):679-85. Epub 2005 Oct 10.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/16216290>
- Hoogenraad CC, Akhmanova A, Galjart N, De Zeeuw CI. LIMK1 and CLIP-115: linking cytoskeletal defects to Williams syndrome. *Bioessays*. 2004 Feb;26(2):141-50. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/14745832>
- Meyer-Lindenberg A, Mervis CB, Sarpal D, Koch P, Steele S, Kohn P, Marengo S, Morris CA, Das S, Kippenhan S, Mattay VS, Weinberger DR, Berman KF. Functional, structural, and metabolic abnormalities of the hippocampal formation in Williams syndrome. *J Clin Invest*. 2005 Jul;115(7):1888-95. Epub 2005 Jun 9.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/15951840>  
*Free article on PubMed Central:* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1143592/>
- Morris CA, Mervis CB. Williams syndrome and related disorders. *Annu Rev Genomics Hum Genet*. 2000;1:461-84. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/11701637>
- Rosso S, Bollati F, Bisbal M, Peretti D, Sumi T, Nakamura T, Quiroga S, Ferreira A, Cáceres A. LIMK1 regulates Golgi dynamics, traffic of Golgi-derived vesicles, and process extension in primary cultured neurons. *Mol Biol Cell*. 2004 Jul;15(7):3433-49. Epub 2004 Apr 16.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/15090620>  
*Free article on PubMed Central:* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC452595/>
- Scott RW, Olson MF. LIM kinases: function, regulation and association with human disease. *J Mol Med (Berl)*. 2007 Jun;85(6):555-68. Epub 2007 Feb 10. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/17294230>
- Stanyon CA, Bernard O. LIM-kinase1. *Int J Biochem Cell Biol*. 1999 Mar-Apr;31(3-4):389-94. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/10224665>
- Tassabehji M. Williams-Beuren syndrome: a challenge for genotype-phenotype correlations. *Hum Mol Genet*. 2003 Oct 15;12 Spec No 2:R229-37. Epub 2003 Sep 2. Review.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/12952863>
- Yoshioka K, Foletta V, Bernard O, Itoh K. A role for LIM kinase in cancer invasion. *Proc Natl Acad Sci U S A*. 2003 Jun 10;100(12):7247-52. Epub 2003 May 30.  
*Citation on PubMed:* <https://www.ncbi.nlm.nih.gov/pubmed/12777619>  
*Free article on PubMed Central:* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC165861/>

---

Reprinted from Genetics Home Reference:  
<https://ghr.nlm.nih.gov/gene/LIMK1>

Reviewed: March 2008  
Published: March 21, 2017

Lister Hill National Center for Biomedical Communications  
U.S. National Library of Medicine  
National Institutes of Health  
Department of Health & Human Services